Appendix A

Development of Acceptable Leachate Concentrations

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A-1. INTRODUCTION

Due to the uncertainty associated with the masses and the subsequent modeling of the leachate concentration, acceptable leachate concentrations (ALCs) for use at the ICDF were developed for those COPCs identified in the Leachate/Contaminant Reduction Time Study (EDF-ER-274). Radiological COPCs should be evaluated using the proposed standard "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota" (DOE, in preparation). It is approved by EH-4 for interim use by DOE program and field elements in evaluating doses to biota. This technical standard provides dose evaluation methods that can be used to meet the requirements of DOE Orders 5400.1 and 5400.5.

The leachate is considered the major pathway of exposure to ecological receptors since the soil exposure will be limited by the 2-ft clean fill layer maintained during facility operations and the biobarrier that will be in place when the facility is completed. These ALCs can then be used to calculate the acceptable mass using the approach documented in EDF-ER-274. The ALCs are designed to be protective of all other ecological receptors with access to the pond.

The approach is based on EPA (1999) and is considered less conservative since it more completely models the food web than the EBSL and HQ analysis documented in VanHorn, Hampton, and Morris (1995) that was primarily used in the main analysis. In this approach, several species were selected as receptors to evaluate the pathways presenting the most likely route of exposure from potential contaminants at the ICDF leach pond. Both terrestrial and aquatic receptors were selected since it is apparent that the leach pond will experience use by waterfowl. However aquatic organisms, such as fish and other benthic organisms, were not assessed since this facility is not considered a natural water body. After the ICDF mission (estimated 15 years) is accomplished the pond will be eliminated as a source of drinking water for those species present at the INEEL and it is not connected to any natural waterbody.

The deer mouse, mule deer, coyote, Townsend's western big-eared bat, mourning dove, mallard duck, spotted sandpiper, sage grouse, red-tailed hawk, and bald eagle were selected as receptors. Since this pond is not a natural water body the time of exposure or area use factor was significantly reduced for both the mallard duck and spotted sandpiper. As discussed in Section 4, the time estimated for use of the pond by these species was reduced to one week per year. This evaluation was also be used to estimate risk to these receptors from concentration of contaminants in the pond. Contaminants of concern were taken from the proposed inventory of contaminants to be disposed of in the landfill including arsenic, boron, calcium, chlorine, magnesium, phosphorus, potassium, selenium, sulfur, vanadium, and zinc. Concentrations in the leachate for these contaminants were modeled as discussed in EDF ER-274. Calcium, magnesium, and potassium were eliminated from the list of COPCs because these chemicals are essential nutrients and are not considered toxic unless present in extremely high concentrations (10X background values). Chlorine was also eliminated as a COPC because chlorine is a strong oxidizer and will react rapidly with inorganic compounds. The presence of light will also accelerate the dissipation of chlorine in water (Vulcan chemicals). Therefore, chlorine is not likely to remain in the pond for a long period of time.

For the remaining COPCs, the fraction of the total water body COPC concentration in the water column and benthic sediment (used to calculate exposure) was calculated using the approach and defaults presented Chapter 3 of EPA (1999). These fractions are presented in Table A-1 and were used to calculate the ALCs. ALCs were back-calculated from the hazard quotient (of 1.0) to present the allowable leachate

concentrations that may be present in the leach pond. Due to the conservative assumptions concerning exposure to the pond it is assumed that a HQ of 1.0 will be protective in the presence of multiple COPCs.

Modeled concentrations for vanadium are a potential problem for the deer mouse and bat using this approach. However, if the conservative assumption of 100% site area use by these receptors was more realistically modeled this would not be a risk.

Boron also has a very high modeled leachate concentration. Although essential to plant growth in small amounts, boron in excess of 0.5 mg/L can be stressful or toxic to many plants, and water with a boron concentration of greater than 2.0 mg/L is toxic to most plants (from USGS. Ground Water Atlas of the United States- Segment 1 California Nevada located at http://capp.water.usgs.gov/gwa/). Therefore a concentration of 0.5 mg/L would be considered an AL lacking other available data. Boron concentrations in the inventory were very conservatively evaluated and it is unlikely that concentrations should reach the modeled level.

Exposure to the modeled leachate concentrations of selenium for the mallard and spotted sandpiper, should be monitored since the concentration is very close to the ALC. However, this concentration is not anticipated to present risk.

All contaminants should be monitored for in the leachate. However, the masses were very conservatively modeled in the original inventory estimate and it is unlikely that any contaminant will be would be present at these levels in the leachate.

A-1.1 Surface Water Concentrations

Concentrations of COPCs in the surface water were estimated using the total water concentration (ALC) using the approach presented in Chapter 3 of EPA (1999).

A-1.2 Sediment Concentrations

Concentrations of COPCs in sediment were estimated using the total water concentration (ALC) using the approach presented in Chapter 3 of EPA (1999).

A-1.3 Plankton, Aquatic Plants, and Aquatic Invertebrates Concentrations

Concentrations in plankton, aquatic plants, and invertebrates are estimated using a steady-state BCF and the estimated concentration in surface water. This concentration is calculated as follows:

$$C_{biota} = C_w * BCF \qquad \text{(A-1)}$$

where

C_{biota} = COPC concentration in aquatic life (mg/kg)

C_w = COPC concentration in surface water (mg/L)

BCF = Steady state bioconcentration factor for each COPC based on dissolved concentration in water

BCFs based on dissolved concentrations in surface water will be used and are presented in Table A-2.

A-1.4 Herbivorous Birds, Mammals, and Amphibians Concentrations

Herbivores consume only plants and ingest water. The equation used to predict uptake from plants, soil/sediment, and surface water by herbivores is simplified by conservatively assuming that the contaminated fraction of water (Csw), herbivorous diet (Cp), and soils or sediments (Cs/sed) is equal to 1 (i.e., no uncontaminated material is contacted). Because the data are inadequate to distinguish between uptake by different plant species, only one component is required to account for the dietary contribution to exposure; thus, there is no parameter for proportion of each item in diet. The equation below is generalized to address the tissue concentrations of COPCs in herbivores from either an aquatic or terrestrial environment. The equation is the sum of the uptake from diet, soil or sediment, and surface water as follows:

$$C_H = (C_p * P_p * BCF_{p\text{-}H}) + (C_{s/sed} * P_{s/sed} * BCF_{s/sed\text{-}H}) + (C_w * P_w * BCF_{w\text{-}H}) \quad \text{(A-2)}$$

where

C_H = COPC concentration in herbivore (mg/kg)

C_p = COPC concentration in plant (mg/kg)

P_p = Proportion of plant food item in diet that is contaminated (unitless)

$P_{s/sed}$ = Proportion of soil or bed sediment in diet that is contaminated (unitless)

P_w = Proportion of water in diet that is contaminated (unitless)

$BCF_{p\text{-}H}$ = Bioconcentration factor between plants to herbivore (fresh-weight basis [fwb], unitless)

$C_{s/sed}$ = Concentration of COPC in soil or sediment (mg/kg)

$BCF_{s/sed\text{-}H}$ = Bioconcentration factor between soil or sediment to herbivore (unitless)

C_w = COPC concentration in surface water (mg/L)

$BCF_{w\text{-}H}$ = Bioconcentration factor between surface water and herbivore (unitless).

To estimate a BCF from food, the biotransfer factor (Ba) for the COPC will be multiplied by the dietary IR (IR_F) for that receptor according to the generalized equation as follows:

$$BCF_F = Ba * IR_F \quad \text{(A-3)}$$

where

BCF_F = Uptake factor between herbivore and plants (unitless)

Ba = COPC-specific biotransfer factor (day(d)/kg fresh weight)

IR_F = Dietary ingestion rate (kg fresh weight/d).

To estimate a BCF from soil or sediment, the Ba for the COPC will be multiplied by the media IR for soil or sediment ($IR_{s/sed}$) or for surface water (IR_w) for that receptor as follows:

$$BCF_{s/sed\text{-}H} = Ba * IR_{sed\ or\ soil}\ BCF_{w\text{-}H} = Ba * IR_{w} \quad \text{(A-4)}$$

where

$BCF_{s/sed-H}$ = Uptake factor between soil/sediment to herbivore (unitless)

Ba = Biotransfer factor between soil or sediment to herbivore (d/kg, fwb), COPC-specific

$IR_{s/sed}$ = Soil or sediment ingestion rate (kg/d, fwb)

BCF_{w-H} = Bioconcentration factor between water and herbivore (unitless)

Ba = Biotransfer factor between water and herbivore (d/L, fwb)

IR_{w} = Water ingestion rate (L/d).

Ba values on a fresh-weight basis were obtained from Baes et al. (1984). For selenium and zinc, they were obtained from EPA (1999) which indicated that Ba values were derived by dividing uptake slope factors obtained from EPA (1993) by a daily consumption rate. For use in calculating BCF values, dry weight Ba values were converted to a fresh-weight basis. BCFs are presented in Table A-2.

A-1.5 Omnivorous Birds and Mammals Concentrations

Omnivores consume both plant and animal material. Since plants and invertebrates or other animals may not accumulate contaminants at the same rate or to the same level, the contribution from each type of diet must be summed to obtain total dietary exposure. Plants will not be broken into separate types for modeling due to the uncertainty; thus, there is only one plant component. The equation as follows:

$$C_{OM} = \Sigma(C_{Ai} * P_{Ai} * F_{Ai}) + \Sigma(C_{tp} * BCF_{p\text{-}om} * P_{p} * F_{p}) + (C_{s/sed} * P_{s/sed} * BCF_{s/sed}) + (C_{w} * P_{w} * BCF_{w\text{-}om}) \quad \text{(A-5)}$$

where

C_{OM} = COPC concentration in omnivore (mg/kg)

C_{Ai} = COPC concentration in *i*th animal food item (mg/kg)

F_{Ai} = Fraction of diet consisting of *i*th animal food item (unitless)

BCF_{p-om} = Bioconcentration factor for plant-to-omnivore (unitless)

C_{p} = COPC concentration in plants (mg/kg)

F_{P} = Fraction of diet consisting of plants (unitless)

P_{Ai} = Proportion of *i*th animal food item in diet that is contaminated (unitless)

P_{p} = Proportion of plant food item in diet that is contaminated (unitless)

$P_{s/sed}$ = Proportion of soil or bed sediment in diet that is contaminated (unitless)

P_w = Proportion of water in diet that is contaminated (unitless)

$C_{s/sed}$ = COPC concentration in soil or bed sediment (mg/kg)

$BCF_{s/sed}$ = Bioconcentration factor for soil- or bed- sediment-to-omnivore (unitless)

C_w = Total COPC concentration in water column (mg/L)

$BCF_{w\text{-}OM}$ = Bioconcentration factor for water-to-omnivore (L/kg).

Receptor-specific uptake concentrations and variables and COPC- and receptor-specific media-to-omnivore are presented in this appendix. They were calculated with the equation listed above for an omnivore. BCFs are presented in Table A-2.

A-1.6 Carnivorous Birds and Mammals Concentrations

Carnivores consume animal matter. The equation used to predict uptake from animal tissue, soil, sediment, and surface water into carnivores was obtained from EPA (1999). The equation is the sum of the uptake from diet, soil or sediment, and surface water as follows:

$$C_C = \sum (C_{Ai} *(P_{Ai} * F_{Ai}) + (C_{s/sed} * *P_{s/sed} * BCF_{s/sed})+ (C_w * P_w * BCF_{w\text{-}c}) \quad \text{(A-6)}$$

where

C_c = COPC concentration in carnivore (mg/kg)

C_{Ai} = COPC concentration in *i*th animal food item (mg/kg)

P_{Ai} = Proportion of *i*th animal food item in diet that is contaminated (unitless)

$P_{s/sed}$ = Proportion of soil or bed sediment in diet that is contaminated (unitless)

P_w = Proportion of water in diet that is contaminated (unitless)

F_{Ai} = Fraction of diet consisting of *i*th animal food item (unitless)

$C_{s/sed}$ = COPC concentration in soil or bed sediment (mg/kg)

$BCF_{s/sed}$ = Bioconcentration factor for soil- or bed- sediment-to-carnivore (unitless)

C_w = Total COPC concentration in water column (mg/L)

$BCF_{w\text{-}c}$ = Bioconcentration factor for water-to-carnivore (L/kg).

BCFs are presented in Table A-2.

A-1.7 Exposure Dose to Mammals and Birds

Exposure parameters are values used to estimate the daily dose for each of the species-specific receptors that represent the different feeding guilds (e.g., herbivores or carnivores). Parameters for each of the receptors were obtained from various sources and are presented in Table A-3. The lowest mean body weight value from EPA (1993) was used for each receptor to derive IRs using allometric equations from

EPA (1993). Animals will be assumed to inhabit the exposure area year-round; risk estimates therefore will be conservative enough to be protective of the area's numerous migrants.

A-1.7.1 Exposure Doses to Mammals

Risk to animals in the taxonomic class *Mammalia* is addressed by selecting several species of mammals from different feeding guilds (e.g., herbivores or carnivores) and evaluating exposure for each species. Exposure is assessed by quantifying the daily dose (DD) ingested from consuming contaminated food items (i.e., plant and animal) and abiotic media. The COPC daily dose ingested (expressed as the mass of COPC ingested per kilogram of body weight per day) depends on the COPC concentration in plant and animal food items and media, the measurement receptor's trophic level (i.e., consumer), the trophic level of animal food items (i.e., prey), and the measurement receptor's IR of each food item and media. The complexity of the daily dose equation will depend on (1) the number of food items in a measurement receptor's diet and (2) the trophic level of each food item and of the receptor. The daily dose of COPC ingested by a receptor, considering all food items and media ingested, can be calculated from the following generic equation (EPA 1999):

$$DD = \Sigma\ IR_F * C_i * P_i * F_{i+} \Sigma\ IR_M * C_M * P_M \qquad \text{(A-7)}$$

where

DD = Daily dose of COPC ingested (mg COPC/kg bw-day)

IR_F = Measurement receptor plant or animal food item ingestion rate (kg/kg bw-day)

Ci = COPC concentration in ith plant or animal food item (mg COPC/kg)

Pi = Proportion of ith food item that is contaminated (unitless)

Fi = Fraction of diet consisting of plant or animal food item i (unitless)

IR_M = Measurement receptor media ingestion rate (kg/kg bw-day [soil or bed sediment] or L/kg bw-day [water])

C_M = COPC concentration in media (mg/kg [soil or bed sediment] or mg/L [water])

P_M = Proportion of ingested media that is contaminated (unitless).

The daily dose of COPC ingested by a receptor is determined by summing the contributions from each contaminated plant, animal, and media food item. The parameters account for 100% of the measurement receptor's diet or total daily mass of potentially contaminated food items that are ingested. However, if a food item or media at the ICDF leach pond is not contaminated (i.e., the measured or modeled COPC concentration in the media or resulting food item is zero), then the daily mass of that food item or media ingested does not contribute to the daily dose of COPC ingested. The proportion of plant or animal food item that is contaminated, *Pi,* numerically accounts for the fraction of a respective food item that may potentially be obtained from outside the geographical limits of the impacted habitat (i.e., outside the area of contamination). For the SLERA, P_i and P_m will initially be set to 1.

For receptors ingesting more than one plant or animal food item (i.e., omnivore), EPA (1999) recommends that exposure be separately quantified assuming that the measurement receptor ingests both "equal" and "exclusive" diets. Not only does this constitute the most complete evaluation of exposure

potential for a measurement receptor; if warranted, it also identifies which pathways are driving risk specific to a COPC and measurement receptor.

A-1.7.2 Exposure Doses to Birds

The same procedure listed in the above section was applied to avian species.

A-1.8 Effects Analysis

The toxicity values for the COPCs of concern are presented in Tables A-4 and A-5 and are from the compilation in *Toxicological Benchmarks for Wildlife* (Opresko, Sample, and Suter 1996) and toxicity values listed in the Terretox database of EPA's ECOTOX Database System (EPA 1996b). A limited number of mammalian TRVs were obtained from EPA (2000), *Ecological Soil Screening Level Guidance, Draft, Eco-SSL-Ecological Soil Screening Levels*. If the newer value was lower than the SLERA value then the lower value was retained.

The COPCs that do not have ecotoxicity values cannot be quantitatively addressed. However, all contaminants listed as a possible concern in the leachate are either qualitatively or quantitatively addressed.

If information on ED and body weight was available, EPA (1999) converted dietary concentration to dose with the following generic equation:

$$Dose = (C_{diet} * IR) / BW \quad \text{(A-8)}$$

where

$Dose$ = COPC dose (mg COPC/kg bw/day)

C_{diet} = Concentration of COPC in diet (mg COPC/kg food)

IR = Food ingestion rate (kg/day)

BW = Test organism body weight (kg).

Table A-1. Acceptable leachate concentrations for use at the ICDF.

COPC	Fraction of total water body concentration in water column (unitless)	Fraction of total water body concentration in benthic sediment (unitless)	ALC (mg/L)	Modeled Leachate Concentrations (mg/L)	Ambient Criter (ug/L
Arsenic	6.43E-01	3.57E-01	6	1.53	340
Boron	—	—	-[a]	40.7	—
Calcium	—	—	-[b]	4.86	—
Chlorine	—	—	-[c]	16.6	19
Magnesium	—	—	-[b]	0.25	—
Phosphorus	—	—	-[d]	6.8	—
Potassium	—	—	-[b]	0.089	—
Selenium	9.05E-01	9.50E-02	0.07	0.073	5.0 (13-
Sulfur	—	—	-[c,d]	373	—
Vanadium	5.11E-02	9.49E-01	3	3.48	—
Zinc	4.60E-01	5.40E-01	8	0.031	120

a. Boron toxicity and AWQC are lacking. See the discussion in Section A-1.

b. Toxicity reference values are not available to establish an ALC for calcium, magnesium, or potassium. However, these COPCs are essen toxic expected under extremely high concentrations (10X background).

c. A soil-water partition coefficient (Kd) value was not available for chlorine or sulfur so an ALC could not be calculated.

d. Toxicity reference values were not available for establishing an ALCs for phosphorus or sulfur.

NOTE: — = no information available or value not calculated.

Table A-2. Bioconcentration factors and biotransfer factors (EPA 1999 unless otherwise noted).

COPC	BCF_{SI}	BCF_r	BCF_{SEDBI}	BCF_{WI}	BCF_{ALGAE}	
Arsenic	0.11	0.036	0.9	73	293	
Boron	NA	NA	NA	NA	NA	
Selenium	0.22	0.016	0.9	1,262	1,845	
Vanadium	NA	NA	NA	NA	NA	
Zinc	0.56	1.2E-12	0.57	4,578	2,175	
	Mule Deer			***Deer***		
COPC	$BCF_{s/sed-H}$	BCF_{p-H}	BCF_{w-H}	$BCF_{s/sed-Om}$	BC	
Arsenic	NA	3.20E-02	9.06E-03	NA	2.58	
Boron	1.54E-05	1.28E-02	3.36E-03	2.27E-08	1.03	
Selenium	2.36E-03	3.63E-02	1.03E-02	1.24E-03	2.93	
Vanadium	NA	4.00E-02	1.13E-02	NA	3.23	
Zinc	1.83E-05	1.44E-03	4.08E-04	9.61E-06	1.16	
	Mourning Dove			***Mule***		
COPC	BCF_{p-H}	BCF_{w-H}	$BCF_{s/sed-H}$	BCF_{p-H}	BC	
Arsenic	NA	NA	NA	3.20E-02	9.06	
Boron	NA	NA	NA	1.28E-02	3.36	
Selenium	1.00E-01	1.57E-02	2.36E-03	3.63E-02	1.03	
Vanadium	NA	NA	NA	4.00E-02	1.13	
Zinc	7.74E-04	1.21E-04	1.83E-05	1.44E-03	4.08	

Table A-2. (continued).

COPC	*Mallard Duck*			*Bald Eagle*		
	$BCF_{p\text{-}Om}$	$BCF_{w\text{-}Om}$	$BCF_{s/sed\text{-}Om}$	$BCF_{w\text{-}C}$	$BCF_{s/sed\text{-}C}$	BC
Arsenic	NA	NA	NA	NA	NA	N
Boron	NA	NA	NA	NA	NA	N
Selenium	2.86E-01	6.86E-02	2.07E-03	1.39E-01	3.89E-03	6.47
Vanadium	NA	NA	NA	NA	NA	N
Zinc	2.21E-03	5.31E-04	1.61E-05	1.08E-03	3.01E-05	5.01

COPC	*Coyote*		*Sage Grouse*		*Big-eared Bat*	
	$BCF_{w\text{-}C}$	$BCF_{s/sed\text{-}C}$	$BCF_{w\text{-}C}$	$BCF_{s/sed\text{-}C}$	$BCF_{w\text{-}C}$	$BCF_{s/sed\text{-}C}$
Arsenic	1.14E-03	3.24E-05	NA	NA	2.85E-06	3.26E-08
Boron	4.56E-04	1.30E-05	NA	NA	1.14E-06	1.31E-08
Selenium	1.29E-03	3.68E-05	6.67E-02	5.66E-03	3.24E-06	3.70E-08
Vanadium	1.43E-03	4.05E-05	NA	NA	3.57E-06	4.08E-08
Zinc	5.13E-05	1.46E-06	5.16E-04	4.39E-05	1.28E-07	1.47E-09

Table A-3. Input parameters for terrestrial receptors.

			Terrestrial Receptors							
Units	Description		DM	COY	MD	BEB	MDV	BE	SG	RTH
Kg	Body weight	BW	0.0148	7	70	0.009	0.115	3	1	0.95
kg/kg bw-day, wwb	Food ingestion rate	FIR	0.872	0.258	0.229	0.567	0.770	0.128	0.168	0.17
L/kg bw-day	Water ingestion rate	WIR	0.151	0.081	0.06	0.159	0.120	0.041	0.059	0.06
kg/kg bw-day, dwb	Soil/sediment ingestion rate	SIR	0.002	0.002	0.0003	0.0018	0.018	0.001	0.005	0.00
Unitless	Fraction plant in diet	PPLNT	0.5	0	1	0	1	0	0	0
Unitless	Fraction invertebrate in diet	PINVERT	0.5	0	0	1	0	0	1	0
Unitless	Fraction prey in diet	PPREY	0	1	0	0	0	1	0	1
Unitless	Fraction soil/sediment in diet	PS	0.01	0.028	0.01	0.01	0.093	0.014	0.093	0.02
Hectares	Home range	RANGE	1	8000	243	4928	5480	3750	2590	130
Unitless	Area use factor	AUF	1.0	1.0	1.0	1.0	1.0	TBD	1.0	TBI

NOTE: Ingestion rate values were obtained from allometric equations as appropriate.

Receptor Key

deer mouse-DM	DM – for FIR, used rodent mammal equation, moisture as omnivore
coyote-COY	COY - for FIR, used mammal equation, moisture as carnivore
mule deer-MD	MD - for FIR, used mammal equation, moisture as herbivore
Big-eared bat (Townsend's)-BEB	BEB - for FIR, used mammal equation, moisture as carnivore
Mourning dove-MDV	MDV - for FIR, used non-passerine bird equation, moisture as herbivore
sage grouse-SG	SG – for FIR, used non-passerine bird equation, moisture as carnivore
red-tailed hawk-RTH	RTH - for FIR, used non-passerine bird equation, moisture as carnivore
mallard duck-MDK	MDK - for FIR, used non-passerine bird equation, moisture as omnivore
bald eagle-BE	BE – for FIR, used non-passerine bird equation, moisture as carnivore

Table A-4. Toxicity reference values, part 1 (from EPA [1999] for receptors unless otherwise noted).[a]

COPC	Mammalian TRV (mg/kg bw-day)	Endpoint and Duration	Eco TRVs (mg/kg-d)[b]	Avian TRV (mg/kg bw-day)	Endpoint and Duration	Eco TRVs (mg/kg-d)[b]	Terrestrial Plant TRV (mg/kg)	Endpoin Durat
Aluminum	1.93	Chronic LOAEL; UF=0.1	NA	100	Chronic NOAEL; UF=1	NA	5	Subchron NOEC; U
Ammonia	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	0.07	Chronic LOAEL; UF=0.1	4.40	NA	NA	NA	0.5	Unk; UF=
Arsenic	1.25	Chronic NOAEL; UF=1	NA	2.46	Chronic NOAEL; UF=1	NA	1	Chronic I UF=0.1
Barium	0.51	Chronic NOAEL; UF=1	NA	20.8	Subchronic NOAEL; UF=0.1	NA	5	Chronic I UF=0.01
Beryllium	1	Chronic NOAEL; UF=1	NA	NA	NA	NA	0.1	Unk; UF=
Bromine	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	0	Chronic NOAEL; UF=0.01	NA	1.45	Chronic NOAEL	NA	0.2	Chronic I UF=0.1
Chromium, total	24.5	b	24.50	1.60	NA	1.60	5.00	b
Chromium(III)	24.5	b	24.50	1.60	NA	1.60	5.00	b

Table A-4. (continued).

COPC	Mammalian TRV (mg/kg bw-day)	Endpoint and Duration	Eco TRVs (mg/kg-d)[b]	Avian TRV (mg/kg bw-day)	Endpoint and Duration	Eco TRVs (mg/kg-d)[b]	Terrestrial Plant TRV (mg/kg)	Endpoint and Duration	Eco SSLs (mg/kg)[b]	AWQC (mg/L)	Endpoint
Chromium(VI)	3.50	Chronic NOAEL; UF=1	22.00	1	Chronic NOAEL; UF=1	NA	0.018	Subchronic EC50; UF=0.01	5.00	1.10E-02	CCC
Cobalt	10	b	10.40	1.30	b	1.30	NA	NA	NA	NA	NA
Copper	12.00	Chronic NOAEL; UF=1	NA	46.97	Chronic NOAEL; UF=1	NA	1	Chronic LOEC; UF=0.1	NA	9.00E-03	CCC; hardness-dependent
Hydrogen bromide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrogen cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.20E-03	NOAA SQUIRT, 1999
Hydrogen fluoride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	0.04	Chronic NOAEL; UF=0.01	NA	0.025	Acute LOAEL; UF=0.001	NA	4.6	Chronic LOEC; UF=0.1	NA	2.50E-03	CCC; hardness-dependent
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercuric chloride	1.01	Chronic NOAEL; UF=1	NA	3.25	Acute LOAEL; UF=0.01	NA	0.349	Acute NOEC; UF=0.01	NA	7.70E-04	CCC
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.70E-04	NOAA SQUIRT, 1999
Methyl mercury	0.03	Subchronic NOAEL; UF=1	NA	0.0064	Chronic LOAEL; UF=0.1	NA	NA	NA	NA	2.80E-06	Tier II SCV
Nickel	50	Chronic NOAEL; UF=1	NA	65	Subchronic NOAEL; UF=0.1	NA	25	Chronic NOEC	NA	5.20E-02	CCC; hardness-dependent
Phosphine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table A-4. (continued).

COPC	Mammalian TRV (mg/kg bw-day)	Endpoint and Duration	Eco TRVs (mg/kg-d)[b]	Avian TRV (mg/kg bw-day)	Endpoint and Duration	Eco TRVs (mg/kg-d)[b]	Terrestrial Plant TRV (mg/kg)	Endpoin Durat
Phosphorus	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus pentoxide	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	0.08	Chronic LOAEL; UF=0.1	NA	0.5	Chronic NOAEL; UF=1	NA	0.05	Subchron NOEC; U
Silver	0.38	Chronic LOAEL; UF=0.1	NA	178	Subchronic NOAEL; UF=0.1	NA	0.02	Unk; UF=
Sulfur	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	0.01	Subchronic LOAEL; UF=0.01	NA	0.35	Acute LD50; UF= 0.01	NA	0.01	Unk; UF=
Uranium, total	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	10	Subchronic NOAEL; UF=0.1	NA	130.9	Chronic NOAEL; UF=1	NA	0.9	Chronic I UF=0.1

Table A-4. (continued).

COPC	Mammalian TRV (mg/kg bw-day)	Endpoint and Duration	Eco TRVs (mg/kg-d)[b]	Avian TRV (mg/kg bw-day)	Endpoint and Duration	Eco TRVs (mg/kg-d)[b]	Terrestrial Plant TRV (mg/kg)	Endpoin Durat

a. EPA, 1999, "Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities," Peer Rev U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

b. EPA, 2000, *Ecological Soil Screening Level Guidance, Draft, Eco-SSL-Ecological Soil Screening Levels*, U.S. Environmer and Emergency Response, Washington, D. C., July 10, 2000.

c. MacDonald, D.D., C.G. Ingersoll, and T.A. Berger, 2000, "Development and Evaluation of Consensus-Based Sediment Qu *Arch. Environ. Contam. Toxicol.*, Vol. 39, pp. 20-31.

NOTES:

AWQC = Ambient water quality criteria

CCC = Chronic continuous concentration

EC = Effect concentration for 50% of the test population

FCV = Final chronic value

LD = Lethal dose

LOAEL = Lowest observable effects level

LOEC = Lowest observed effect concentration

NA = Not available

NOAA = National Oceanic and Atmospheric Administration

NOAEL = No observable adverse effects level

NOEC = No observed effect concentration

SCV = Secondary chronic value

SQUIRT = NOAA's Screening Quick Reference Tables

SSL = Soil screening level

UF = Uncertainty factor

Table A-5. Toxicity reference values, part 2 (from EPA [1999] for receptors unless otherwise noted).[a]

COPC	Bed Sediment (dry weight) TRV (mg/kg)	Consensus-Based TEC (mg/kg dw)[b]	Soil Fauna TRV (mg/kg)	Endpoint and
Aluminum	1.40E+04	NA	NA	NA
Ammonia		NA	NA	NA
Antimony	3.00E+00	NA	NA	NA
Arsenic	5.90E+00	9.79E+00	2.50E-01	Chronic N
Barium	2.00E+01	NA	NA	NA
Beryllium		NA	NA	NA
Bromine		NA	NA	NA
Cadmium	5.83E-01	9.90E-01	1.00E+01	Chronic N
Chromium, total	2.60E+01	4.34E+01	NA	NA
Chromium(III)	4.34E+01	4.34E+01	NA	NA
Chromium(VI)	4.34E+01	4.34E+01	2.00E-01	Chronic LOE(
Cobalt		NA	NA	NA
Copper	1.60E+01	3.16E+01	3.20E+01	Chronic N
Hydrogen bromide		NA	NA	NA
Hydrogen cyanide		NA	NA	NA
Hydrogen fluoride		NA	NA	NA
Lead	3.10E+01	3.58E+01	1.00E+02	Chronic N
Manganese	6.30E+02	NA	NA	NA
Mercuric chloride	1.80E-01	1.80E-01	2.50E+00	Methyl m
Mercury	1.70E-01	1.80E-01	NA	NA
Methyl mercury	1.80E-01	1.80E-01	2.50E+00	Chronic N
Nickel	1.60E+01	2.27E+01	1.00E+02	Chronic N

Table A-5. (continued).

COPC	Bed Sediment (dry weight) TRV (mg/kg)	Consensus-Based TEC (mg/kg dw)[b]	Soil Fauna TRV (mg/kg)	Endpoint and
Phosphine		NA	NA	NA
Phosphorus		NA	NA	NA
Phosphorus pentoxide		NA	NA	NA
Selenium	1.00E-01	NA	7.70E+00	Chronic LOE(
Silver	4.50E+00	NA	NA	NA
Sulfur		NA	NA	NA
Thallium		NA	NA	NA
Uranium, total		NA	NA	NA
Vanadium		NA	NA	NA
Zinc	1.10E+02	1.21E+02	1.20E+02	b

a. EPA, 1999, "Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities," Peer Rev U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

b. MacDonald, D.D., C.G. Ingersoll, and T.A. Berger, 2000, "Development and Evaluation of Consensus-Based Sediment Qu Ecosystems," *Arch. Environ. Contam. Toxicol.*, Vol. 39, pp. 20-31.

c. EPA, 2000, *Ecological Soil Screening Level Guidance, Draft, Eco-SSL-Ecological Soil Screening Levels*, U.S. Environmen Solid Waste and Emergency Response, Washington, D.C., July 10, 2000.

NOTES:

LOEC = Lowest observed effects concentration

NA = Not available

NOEC = No observed effects concentration

SSL = Soil screening level

TEC = Toxicity equivalency factor

UF = Uncertainty factor

Appendix B

Hazard Quotient and Hazard Index Tables

Table B-1. Hazard quotients and hazard indices for nonradionuclide contaminants.

	Acetone	Aroclor-1254	Boron	Copper	Cyanide	Fluoride	Lead	Me
Soil concentration (mg/kg)	4.97E-01	1.04E-01	1.45E+02	1.06E+01	2.52E-01	2.91E+00	1.92E+01	3.4
Water concentration (mg/L)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0
Functional groups								
Amphibians (A232)	NA	NA	NA	NA	NA	NA	NA	
Avian herbivores (AV121)	NA	4.0E-03	6.8E-01	1.3E-01	2.8E-01	1.5E-01	1.5E-01	1.3
Avian herbivores (AV122)	NA	1.1E-01	4.2E+00	7.9E-01	1.8E+00	9.4E-01	2.2E+00	8.2
Avian herbivores (AV132)	NA	NC	NC	NC	NC	NC	NC	
Avian herbivores (AV142)	NA	NC	NC	NC	NC	NC	NC	
Avian herbivores (AV143)	NA	NC	NC	NC	NC	NC	NC	
Trumpeter swan	NA	NC	NC	NC	NC	NC	NC	
Avian insectivores (AV210)	NA	6.4E-03	3.8E-02	2.8E-01	3.8E-01	2.7E-01	1.5E+00	1.1
Black tern	NA	1.6E-02	9.1E-02	5.5E-02	7.6E-02	5.4E-02	9.6E-01	5.2
Avian insectivores (AV210A)	NA	1.4E-02	8.0E-02	4.0E-01	5.5E-01	3.9E-01	2.2E+00	1.6
Avian insectivores (AV221)	NA	1.5E-02	9.1E-02	4.5E-01	6.1E-01	4.4E-01	2.5E+00	1.8
Avian insectivores (AV222)	NA	6.8E-02	4.0E-01	6.5E-01	8.9E-01	6.3E-01	4.1E+00	2.8
Avian insectivores (AV222A)	NA	4.4E-02	2.6E-01	4.2E-01	5.8E-01	4.1E-01	2.7E+00	1.8
Avian insectivores (AV232)	NA	NC	NC	NC	NC	NC	NC	
Avian insectivores (AV233)	NA	NC	NC	NC	NC	NC	NC	
White-faced ibis	NA	NC	NC	NC	NC	NC	NC	
Avian insectivores (AV241)	NA	NC	NC	NC	NC	NC	NC	
Avian insectivores (AV242)	NA	NC	NC	NC	NC	NC	NC	
Avian carnivores (AV310)	NA	2.4E-03	8.9E-04	1.4E-03	1.2E-02	4.2E-03	6.9E-02	4.3
Northern goshawk	NA	3.0E-04	1.1E-04	1.8E-04	1.5E-03	5.4E-04	4.5E-03	3.2
Peregrine falcon	NA	2.2E-03	8.0E-04	1.3E-03	1.1E-02	3.8E-03	3.2E-02	2.3
Avian carnivores (AV322)	NA	8.8E-02	3.3E-02	5.2E-02	4.4E-01	1.6E-01	2.5E+00	1.6
Bald eagle	NA	7.8E-05	2.9E-05	4.5E-05	3.8E-04	1.4E-04	2.2E-03	1.4
Ferruginous hawk	NA	3.0E-04	1.1E-04	1.7E-04	1.5E-03	5.2E-04	8.5E-03	5.3

Table B-1. (continued).

	Acetone	Aroclor-1254	Boron	Copper	Cyanide	Fluoride	Lead	M
Loggerhead shrike	NA	9.7E-02	3.6E-02	5.7E-02	4.8E-01	1.7E-01	2.8E+00	1.
Avian carnivores (AV322A)	NA	1.9E-02	6.9E-03	7.7E-03	6.3E-02	2.2E-02	3.6E-01	2.
Burrowing Owl	NA	1.9E-02	6.9E-03	7.7E-03	6.3E-02	2.2E-02	3.6E-01	2.
Avian carnivores (AV333)	NA	NC	NC	NC	NC	NC	NC	
Avian carnivores (AV342)	NA	NC	NC	NC	NC	NC	NC	
Avian omnivores (AV422)	NA	1.8E-01	3.8E-01	9.9E-02	2.9E-01	1.5E-01	8.8E-01	7.
Avian omnivores (AV432)	NA	NC	NC	NC	NC	NC	NC	
Avian omnivores (AV433)	NA	NC	NC	NC	NC	NC	NC	
Avian omnivores (AV442)	NA	NC	NC	NC	NC	NC	NC	
Mammalian herbivores (M121)	4.1E-02	4.8E-04	3.3E-01	8.6E-02	9.2E-04	1.8E-03	3.0E-03	1.
Mammalian herbivores (M122)	1.8E+00	5.1E-02	1.5E+01	4.0E+00	4.2E-02	8.3E-02	2.2E-01	8.
Mammalian herbivores (M122A)	1.6E+00	5.5E-02	1.4E+01	3.6E+00	3.8E-02	7.6E-02	2.3E-01	7.
Pygmy rabbit	7.0E-01	8.2E-03	5.6E+00	1.5E+00	1.6E-02	3.1E-02	5.1E-02	3.
Mammalian herbivores (M123)	1.0E+00	3.4E-02	8.4E+00	2.3E+00	2.4E-02	4.7E-02	1.4E-01	4.
Mammalian insectivores (M210)	1.9E-04	3.7E-03	8.2E-02	1.3E+00	1.1E-02	9.3E-03	1.8E-01	1.
Mammalian insectivores (M210A)	1.8E-04	3.6E-03	7.9E-02	1.3E+00	1.1E-02	9.0E-03	1.7E-01	1.
Townsend's western big-eared bat	2.6E-04	5.1E-03	1.2E-01	3.5E+00	3.0E-02	2.5E-02	4.7E-01	2.
Small-footed myotis	3.7E-04	7.2E-03	1.6E-01	5.0E+00	4.3E-02	3.6E-02	6.7E-01	3.
Long-eared myotis	3.2E-04	6.2E-03	1.4E-01	4.3E+00	3.7E-02	3.1E-02	5.8E-01	3.
Mammalian insectivores (M222)	7.9E-04	1.5E-02	3.4E-01	4.5E+00	3.9E-02	3.3E-02	6.2E-01	3.
Mammalian carnivore (M322)	3.5E-04	2.3E-03	1.5E-01	1.6E-01	5.4E-03	1.6E-03	1.7E-01	8.
Mammalian omnivores (M422)	7.8E-02	1.1E-02	1.7E+00	9.6E-01	1.7E-02	2.6E-02	5.0E-01	2.
Mammalian omnivores (M422A)	7.9E-03	1.1E-03	1.2E-01	2.9E-01	1.7E-03	2.7E-03	6.2E-02	2.
Reptilian insectivores (R222)	NA	NA	NA	NA	NA	NA	NA	
Sagebrush lizard	NA	NA	NA	NA	NA	NA	NA	

luoride	Lead	Mercury (i)	Molyb-denum	Nitrate	Penta-chloro-phenol	Selenium	Silver	Strontium	Sulfate	Xylene	Zinc	Zirconium	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0E+00
NA	3.8E-01	NA	4.0E+00	NA	NA	5.4E-01	2.1E+00	NA	NA	NA	1.3E+00	NA	3.0E+02

range

Table B-2. Hazard quotients and hazard indices for radionuclides (unitless).

	Am-241		Ba-137m		Cs-137		Eu-152		Eu-1	
Soil Concentration (pCi/g)	9.14E-06		1.88E+04		4.37E+03		4.30E+02		3.15E-	
Water Concentration (pCi/L)	0.00E+00		0.00E+00		0.00E+00		0.00E+00		0.00E-	
	Internal	External	Internal	External	Internal	External	Internal	External	Internal	I
Amphibians (A232)	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00	
Avian herbivores (AV121)	1.3E-07	7.3E-12	4.3E-01	4.0E-01	2.0E+00	9.3E-02	2.0E-01	9.1E-03	4.8E-01	
Avian herbivores (AV122)	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00	
Avian herbivores (AV132)	NC	NC	NC	NC	NC	NC	NC	NC	NC	
Avian herbivores (AV142)	NC	NC	NC	NC	NC	NC	NC	NC	NC	
Avian herbivores (AV143)	NC	NC	NC	NC	NC	NC	NC	NC	NC	
Trumpeter swan	NC	NC	NC	NC	NC	NC	NC	NC	NC	
Avian insectivores (AV210)	2.1E-07	1.2E-11	7.1E-01	6.6E-01	3.3E+00	1.5E-01	3.3E-01	1.5E-02	7.9E-01	
Black tern	8.2E-08	4.6E-12	2.7E-01	2.6E-01	1.3E+00	5.9E-02	1.3E-01	5.8E-03	3.0E-01	
Avian insectivores (AV210A)	3.3E-07	1.9E-11	1.1E+00	1.0E+00	5.2E+00	2.4E-01	5.2E-01	2.4E-02	1.2E+00	
Avian insectivores (AV221)	3.3E-07	1.9E-11	1.1E+00	1.0E+00	5.2E+00	2.4E-01	5.2E-01	2.4E-02	1.2E+00	
Avian insectivores (AV222)	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00	
Avian insectivores (AV222A)	3.3E-07	1.9E-11	1.1E+00	1.0E+00	5.2E+00	2.4E-01	5.2E-01	2.4E-02	1.2E+00	
Avian insectivores (AV232)	NC	NC	NC	NC	NC	NC	NC	NC	NC	
Avian insectivores (AV233)	NC	NC	NC	NC	NC	NC	NC	NC	NC	
White-faced Ibis	NC	NC	NC	NC	NC	NC	NC	NC	NC	
Avian insectivores (AV241)	NC	NC	NC	NC	NC	NC	NC	NC	NC	
Avian insectivores (AV242)	NC	NC	NC	NC	NC	NC	NC	NC	NC	

Table B-2. (continued).

	Am-241		Ba-137m		Cs-137		Eu-152		Eu-1
Soil Concentration (pCi/g)	9.14E-06		1.88E+04		4.37E+03		4.30E+02		3.15E-
Water Concentration (pCi/L)	0.00E+00		0.00E+00		0.00E+00		0.00E+00		0.00E-
	Internal	External	Internal	External	Internal	External	Internal	External	Internal
Avian carnivores (AV310)	1.3E-08	7.1E-13	4.2E-02	3.9E-02	2.0E-01	9.1E-03	1.9E-02	9.0E-04	4.7E-02
Northern goshawk	3.2E-09	1.8E-13	1.1E-02	1.0E-02	5.1E-02	2.3E-03	5.0E-03	2.3E-04	1.2E-02
Peregrine falcon	2.1E-08	1.2E-12	7.0E-02	6.5E-02	3.3E-01	1.5E-02	3.2E-02	1.5E-03	7.7E-02
Avian carnivores (AV322)	3.1E-07	1.7E-11	1.0E+00	9.5E-01	4.8E+00	2.2E-01	4.7E-01	2.2E-02	1.1E+00
Bald eagle	1.4E-09	7.9E-14	4.7E-03	4.3E-03	2.2E-02	1.0E-03	2.1E-03	9.9E-05	5.2E-03
Ferruginous hawk	3.2E-09	1.8E-13	1.1E-02	9.9E-03	5.0E-02	2.3E-03	4.9E-03	2.3E-04	1.2E-02
Loggerhead shrike	3.3E-07	1.9E-11	1.1E+00	1.0E+00	5.2E+00	2.4E-01	5.2E-01	2.4E-02	1.2E+00
Avian carnivores (AV322A)	6.9E-08	3.9E-12	2.3E-01	2.1E-01	1.1E+00	5.0E-02	1.1E-01	4.9E-03	2.6E-01
Burrowing owl	6.9E-08	3.9E-12	2.3E-01	2.1E-01	1.1E+00	5.0E-02	1.1E-01	4.9E-03	2.6E-01
Avian carnivores (AV333)	NC	NC	NC	NC	NC	NC	NC	NC	NC
Avian carnivores (AV342)	NC	NC	NC	NC	NC	NC	NC	NC	NC
Avian omnivores (AV422)	2.5E-07	1.4E-11	8.4E-01	7.8E-01	3.9E+00	1.8E-01	3.9E-01	1.8E-02	9.3E-01
Avian omnivores (AV432)	NC	NC	NC	NC	NC	NC	NC	NC	NC
Avian omnivores (AV433)	NC	NC	NC	NC	NC	NC	NC	NC	NC
Avian omnivores (AV442)	NC	NC	NC	NC	NC	NC	NC	NC	NC
Mammalian herbivores (M121)	6.2E-08	3.5E-12	2.1E-01	1.9E-01	9.8E-01	4.5E-02	9.6E-02	4.4E-03	2.3E-01
Mammalian herbivores (M122)	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Mammalian herbivores (M122A)	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Pygmy rabbit	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Mammalian	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00

Table B-2. (continued).

	Am-241		Ba-137m		Cs-137		Eu-152		Eu-1
Soil Concentration (pCi/g)	9.14E-06		1.88E+04		4.37E+03		4.30E+02		3.15E
Water Concentration (pCi/L)	0.00E+00		0.00E+00		0.00E+00		0.00E+00		0.00E
	Internal	External	Internal	External	Internal	External	Internal	External	Internal
herbivores (M123)									
Mammalian insectivores (M210)	2.6E-07	1.5E-11	8.6E-01	8.0E-01	4.0E+00	1.9E-01	4.0E-01	1.8E-02	9.5E-01
Mammalian insectivores (M210A)	1.3E-07	7.3E-12	4.3E-01	4.0E-01	2.0E+00	9.3E-02	2.0E-01	9.1E-03	4.8E-01
Townsend's big-eared bat	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Small-footed myotis	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Long-eared myotis	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Mammalian insectivores (M222)	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Mammalian carnivore (M322)	2.1E-07	1.2E-11	7.1E-01	6.6E-01	3.3E+00	1.5E-01	3.3E-01	1.5E-02	7.9E-01
Mammalian omnivores (M422)	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Mammalian omnivores (M422A)	1.8E-07	1.0E-11	6.1E-01	5.7E-01	2.9E+00	1.3E-01	2.8E-01	1.3E-02	6.8E-01
Reptilian insectivores (R222)	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Sagebrush lizard	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Reptilian carnivores (R322)	5.1E-07	2.9E-11	1.7E+00	1.6E+00	8.1E+00	3.7E-01	7.9E-01	3.7E-02	1.9E+00
Plants	6.2E-11	NC	1.7E-02	NC	8.9E-02	NC	2.6E-03	NC	8.1E-04

NC - The exposure dose could not be calculated for this functional group for lack of a home range

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